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IS NATURE WITHOUT DESIGN?

BY JOHN BURROUGHS

WHAT unthinking people call design in nature is simply the reflection of our inevitable anthropomorphism. Whatever they can use they think was designed for that purpose,—the air to breathe, the water to drink, the soil to plant. It is as if they thought the notch in the mountains was made for the road to pass over, or the bays and harbor for the use of cities and shipping. But in inorganic nature the foot is made to fit the shoe and not the reverse. We are cast in the mold of the environment. If the black cap of the nuthatch that comes to the maple tree in front of my window and feeds on the suet I place there, was a human thinking-cap, the bird would see design in the regular renewal of that bit of suet; he would say, "Some one or something puts that there for me"; but he helps himself and asks no questions. The mystery does not trouble him. Why should not I, poor mortal, feel the same about these blessings and conveniences around me of which I hourly partake, and that seem so providential? Why do not I, with my thinking-cap, infer that someone or something is thinking about me and my well-being? The mass of mankind does draw this inference, and it is well for them to do so. But the case of the bird is different. The bit of suet that I feed on is not so conspicuously something extra—something added to the tree; it is a part of the tree; it is inseparable from it. I am compelled, as it were, to distil it out of the tree, so that instead of being the act of a special providence, it is the inevitable benefaction of the general providence of nature. What the old maple holds for me is maple sugar, but it was not put there for me; it is there just the same, whether I want it or not; it is a part of the economy of the tree; it is a factor in its own growth; the tree is not thinking of me (pardon the term),

but of itself. Of course this does not make my debt to it, and my grounds for thankfulness, any the less real, but it takes it out of the category of events such as that which brings the suet to the nuthatch. The Natural Providence is not intermittent, it is perennial, but it takes no thought of me or you. It is life that is flexible and adaptive, and not matter and force. "We do not," says Renan, "remark in the universe any sign of deliberate and thoughtful action. We may affirm that no action of this sort has existed for millions of centuries." I think we may affirm more than that—we may affirm that it never existed. Some vestige of the old theology still clung to Renan's mind,—there was a day of creation in which God set the universe going, and then left it to run itself; the same vestige clung to Darwin's mind and led him to say that at the beginning God must have created a few species of animals and vegetables and then left them to develop and populate the world.

Says Renan, "When a chemist arranges an experiment that is to last for years, everything which takes place in his retort is regulated by the laws of absolute unconsciousness; which does not mean that a will has not intervened at the beginning of the experiment, and that it will not intervene at the end." There was no beginning, nor will there be any ending to the experiment of creation; the will is as truly there in the behavior of the molecules at one time as at another. The effect of Renan's priestly training and associations clings to him like a birth-mark.

In discussing these questions our plumb-line does not touch bottom, because there is no bottom. "In the infinite," says Renan with deeper insight, "negations vanish, contradictions are merged," in other words, opposites are true. Where I stand on the surface of the sphere is the centre of the sphere, but that does not prevent the point where you stand being the centre also. Every point is a centre, and the sky is overhead at one place as at another; opposites are true.

The moral and intellectual worlds present the same contradictions or limitations—the same relatively of what we call truth.

Nature's ways, which with me is the same as saying God's ways, are so different from ours; "no deliberate and thoughtful action," as Renan puts it, no economy of time

or material, no short cuts, no cutting out of non-essentials, no definite plan, no specific ends, few straight lines or right angles; her streams loiter and curve, her forces are unbridled; no loss or gain, her accounts always balance, the loss at one point, or with one form, is a gain with some other—all of which is the same as saying that there is nothing artificial in nature. All is natural, all is subject to the hit and miss method. The way Nature trims her trees, plants her forests, sows her gardens, is typical of the whole process of the cosmos. God is no better than man because man is a part of God. From our human point of view he is guilty of our excesses and our short-comings. Time does not count, pain does not count, waste does not count. The wonder is that the forests all get planted by the hit-and-miss method, the pines in their places, the spruces in theirs, the oaks and maples in theirs; and the trees get trimmed in due time, now and then, it is true, by a very wasteful method. A tree doctor could save and prolong the lives of many of them. The small fountains and streams all find their way to larger streams and these to still larger, and these to lakes, or to the sea, and the drainage system of the continents works itself out all right. The decay of the rocks and the formation of the soil comes about in due time, but not in man's time. In all the grand processes and transformations of nature the element of time enters on such a scale as dwarfs all human efforts.

When we say of a thing or an event that it was a chance happening, we do not mean that it was not determined by the laws of matter and force, but we mean it was not the result of the human will, or of anything like it; it was not planned or designed by conscious intelligence. Chance in this sense plays a very large part in nature and in life. Though the result of irrefragable laws, the whole non-living world about us shows no purpose or forethought in our human sense. For instance, we are compelled to regard the main features of the earth as matters of chance, the distribution of land and water, of islands and continents, of rivers, lakes, seas, mountains and plains, valleys and hills, the shapes of the continents; that there is more land in the northern hemisphere than in the southern, more land at the South Pole than at the North, is a matter of chance. The serpentine course of a stream through an alluvial plain, a stream two yards wide, winding and ox-bowing precisely

as does the Mississippi, is a matter of chance. The whole geography of a country, in fact, is purely a matter of chance, and not the result of anything like human forethought. The planets themselves—that Jupiter is large and Mercury small, that Saturn has rings, that Jupiter has seven moons, that the Earth has one, that other planets have none, that some of the planets are in a condition to sustain life as we know it, for example, Venus, Earth, and probably Mars, that some revolve in more elliptical orbits than others, that Mercury and Venus apparently always keep the same side towards the sun—all these things are matters of chance. It is easy to say that God designed it thus and so, as did our fathers, but how are we to think of an omnipotent and omniscient Being as planning such wholesale destruction of his own works as occurs in the cosmic catastrophes that the astronomers now and then witness in the sidereal universe, or even as occurs on the Earth, when earthquakes and volcanoes devastate fair lands or engulf the islands of the sea? Why should such a Being design a desert, or invent a tornado, or ordain that some portion of the earth's surface should have almost perpetual rain, and another portion almost perpetual drought? In Hawaii I saw islands that were green and fertile on one end from daily showers, and the other end, ten miles away, a rough barren rock, from the entire absence of showers. Were the trade winds designed to bring the vapors of the sea to the tropic lands?

In following this line of thought we, of course, soon get where no step can be taken. Is the universe itself a chance happening? Such a proposition is unthinkable, because something out of nothing is unthinkable. Our experience in this world develops our conceptions of time and space, and to set bounds to either is an impossible task. We say the cosmos must always have existed, and there we stop.

We are no better off when we turn to the world of living things. Here we see design, particular means adapted to specific ends. Shall we say that a bird or a bee or a flower is a chance happening, as is the rainbow, or the sunset cloud, or a pearl, or a precious stone? Is man himself a chance happening? Here we are stuck and cannot lift our feet. The mystery and the miracle of vitality, as Tyndall called it, is before us. Here is the long hard road of Evolution, the push and the unfolding of life through countless ages, something more than the mechanical and the accidental,

though these have played a part; something less than specific plan and purpose, though we seem to catch dim outlines of these.

Spontaneous variations, original adaptations, a never-failing primal push toward higher and more complex forms—how can we, how shall we, read the riddle of it all? How shall we account for man on purely naturalistic grounds?

The consistent exponent of variation cannot go in partnership with supernaturalism. Grant that the organic split off from the inorganic by insensible degrees, yet we are bound to ask what made it split off at all? and how it was that the first unicellular life contained the promise and the potency of all the life of to-day? Such questions take us into deep waters where our plummet-line finds no bottom. It suits my reason better to say there is no solution, than to accept a solution which itself needs solution, and still leaves us where we began.

The adjustments of non-living bodies to each other seems a simple matter, but in considering the adaptations of living bodies to one another, and to their environment, we are confronted with a much harder problem. Life is an active principle, not in the sense that gravity, or chemical reaction are active principles, but in a quite different sense. Gravity and chemical reactions are always the same, inflexible and uncompromising, but life is ever variable and adaptive; it will take half a loaf if it cannot get a whole one. Gravity answers yea and nay, Life says, "Probably, we will see about it, we will try again tomorrow." The oak leaf will become an oak-ball to accommodate an insect that wants a cradle and a nursery for its young; it will develop one kind of a nursery for one insect and another kind for a different insect.

As far as I have got, or ever hope to get, toward solving the problem of the universe is to see clearly that it is insoluble. One can arrive only at negative conclusions, he comes to see that the problem cannot be dealt with in terms of our human experience and knowledge. But what other terms have we? Our knowledge does not qualify us in any degree to deal with the Infinite. The sphere has no end or handle to take hold of, and the Infinite baffles the mind in the same way. Measured by our human standards, it is a series of contradictions. The method of

Nature is a haphazard method, yet behold the final order and completeness! How many of her seeds she trusts to the winds and the waters, and her fertilizing pollens and germs also! And the winds and the waters do her errands, with many failures, of course, but they hit the mark often enough to serve her purpose. She provides lavishly enough to afford her failures.

When we venture upon the winds and the waters with our crafts we aim to control them, and we reach our havens only when we do control them.

What is there in the method of Nature that answers to the human will in such matters? Nothing that I can see, yet her boats and her balloons reach their havens—not all of them, but enough of them for her purpose. Yet when we apply the word “purpose” or “design” to Nature, to the Infinite, we are describing her in terms of the finite, and fall into contradictions. Still the wings and balloons and hooks and springs in the vegetable world are for a specific purpose—to scatter the seed far from the parent plant. Every part and organ and movement of a living body serves a purpose to that organism. The mountain lily looks straight up to the sky, the meadow lily looks squarely down to the earth; undoubtedly each flower finds its advantage in its own attitude, but what that advantage is, I know not. If Nature planned and invented as man does, she would attain to mere unity and simplicity. It is her blind, prodigal, haphazard methods that result in her endless diversity. When she got a good wing for the seed of a tree, such as that of the maple, she would give this to the seeds of other, similar trees; but she gives a different wing to the ash, to the linden, to the elm, the pine, and the hemlock, and to some she gives no wings at all. The nut-bearing trees, such as the oaks, the beeches, the walnuts, and the hickories, have no wings, except such as are afforded them by the birds and beasts that feed upon them and carry them away. And here again Nature has a purpose in the edible nut which tempts some creatures to carry it away. If all the nuts were devoured, the whole tribe of nut-bearing trees would in time be exterminated, and Nature’s end defeated. But in a world of conflicting forces like ours, chance plays an important part, many of the nuts get scattered, but not all devoured. The hoarding-up propensities of certain birds and squirrels result in the

planting of many oaks and chestnuts and beeches.

The inherent tendency to variation in organic life, together with Nature's hit-and-miss method, account for her endless variety on the same plane, as it were, as that of her many devices for disseminating her seeds. One plan of hook or barb serves as well as another—that of *bidens* as well as that of hound's tongue—yet each has a pattern of its own. The same may be said of the leaves of the trees, namely, to expose the juices of the tree to the chemical action of the light and air, yet behold what an endless variety in the shape and size and structure of the leaves! This is the way of the Infinite—to multiply endlessly, to give a free rein to the physical forces and let them struggle with one another for the stable equilibrium to which they never, as a whole, attain; to give the same free rein to the organic forces and let their various forms struggle with one another for the unstable equilibrium which is the secret of their life.

The many contingencies that wait upon the circuit of the physical forces and determine the various forms of organic matter—rocks, sand, soil, gravel, mountain, plain—all shifting and changing endlessly—wait upon the circuit of the organic forces and turn the life impulse into myriad channels, and people the earth with myriads of living forms, each accidental from our limited point of view, while all are determined by irrefragable laws. The contradictions in such statements are obvious and are inevitable when the finite tries to measure or describe the ways of the Infinite.

The waters of the globe are forever seeking the repose of a dead level, but when they attain it, if they ever do, the world will be dead. Behold what a career they have in their circuit from the sea to the clouds and back to the earth in the ministering rains, and then to the sea again through the streams and rivers! The mantling snow with its exquisite crystals, the grinding and transporting glaciers, the placid or ploughing and turbulent rivers, the sparkling and refreshing streams, the cooling and renewing dews, the softening and protecting vapors, wait upon this circuit of the waters through the agency of the sun, from the sea, through the sky and land, back to the sea again. Yes, and all the myriad forms of life also. This circuit of the waters drives and sustains all the vital machinery of the globe.

Why and how the rain brings the rose and the violet, the peach and the plum, the wheat and the rye, and the boys and the girls, out of the same elements and conditions that they bring the thistles and the tares, the thorn and the scrub, the fang and the sting, the monkey and the reptile, that is the insoluble mystery.

If Nature aspires toward what we call the good in man, does she not equally aspire toward what we call the bad in thorns and weeds and reptiles? May we not say that good is our good, and bad is our bad, and that there is, and can be, no absolute good and no absolute bad, any more than there can be any absolute up or any absolute down?

How haphazard, how fortuitous and uncalculated is all this business of the multiplication of the human race! What freaks, what failures, what monstrosities, what empty vessels, what deformed limbs, what defective brains, what perverted instincts! It is as if in the counsels of the Eternal it had been decided to set going an evolutionary impulse that should inevitably result in man, and then leave him to fail or flourish just as the ten thousand contingencies of the maelstrom of conflicting earth forces should decide, so that whether a man be a cripple or an athlete, a fool or a philosopher, a satyr or a god, becomes largely a matter of chance. Yet the human brain has steadily grown in size, human mastery over nature has steadily increased, and chance has, upon the whole, brought more good to man than evil. Optimism is a final trait of the Eternal.

And the taking off of man, how haphazard! how fortuitous it all is! His years shall be three score and ten, but how few, comparatively, reach that age, how few live out half their days! Disease, accident, stupidity, superstition, cut him off at all ages—in infancy, in childhood, in youth, in manhood—his whole life is a part of the flux and uncertainty of things. No god watches over him aside from himself and his kind, no atom or molecule is partial to him, gravity crushes him, fire burns him, the floods drown him as readily as they do vipers and vermin. He takes his chances, he gains, and he loses, but Nature treats him with the same impartiality that she does the rest of her creatures. He runs the same gauntlet of the hostile physical forces, he pays the same price for his development; but his greater capacity for development—to whom or what does he owe

that? If we follow Darwin we shall say natural selection, and natural selection is just as good a god as any other. No matter what we call it, if it brought man to the head of creation and put all things (nearly all) under his feet, it is god enough for anybody. At the heart of it there is still a mystery we cannot grasp. The ways of Nature about us are no less divine because they are near and familiar. The illusion of the rare and the remote, science dispels. Of course we are still trying to describe the Infinite in terms of the finite.

We are so attached to our kind, and so dependent upon them that most persons feel homeless and orphaned in a universe where no suggestion of sympathy and interest akin to our own comes to us from the great void. A providence of impersonal forces, the broadcast, indiscriminate benefits of Nature, kind deeds where no thought of kindness is, well-being as the result of immutable law—all such ideas chill and disquiet us, until we have inured ourselves to them. We love to fancy that we see friendly hands and hear friendly voices in Nature. It is easy to make ourselves believe that the rains, the warmth, the fruitful seasons, are sent by some Being for our especial benefit. The thought that we are adapted to Nature and not Nature made or modified to suit us, is distasteful to us. It rubs us the wrong way of the fur. We have long been taught to believe that there is air because we have lungs, and water because we need it to drink, and light because we need it to see. Science takes this conceit out of us: The light begat the eye, and the air begat the lungs.

In the universe, as science reveals it to us, sensitive souls experience the cosmic chill; in the universe as our inevitable anthropomorphism shapes it for us, we experience the human glow. The same anthropomorphism has in the past peopled the woods and fields and streams and winds with good and evil spirits, and filled the world with cruel and debasing superstitions; but in our day we have got rid of all of this; we have abolished all gods but one. This one we still fear, and bow down before, and seek to propitiate—not with offerings and sacrifices, but with good Sunday clothes and creeds and pew-rents, and praise, and incense, and surplices and ceremonies. What Brocken shadows our intense personalism casts upon nature! We see the gigantic outlines of our own forms, and mistake

them for a veritable god. But as we ourselves are a part of Nature, so this humanizing tendency of ours is also a part of Nature, a part of human nature—not valid and independent, like the chemical and physical forces, but as valid and real as our dreams, our ideas, our aspirations. All the gods and divinities and spirits with which man has peopled the heavens and the earth are a part of Nature as she manifests herself in our subjective selves. So there we are on a trail that ends where it began. We condemn one phase of Nature through another phase of Nature that is active in our own minds. How shall we escape this self-contradiction? As we check or control the gravity without us by the power of the gravity in our own bodies, so our intelligence must sit in judgment on phases of the same universal Intelligence manifested in outward Nature.

It is this recognition of an Intelligence in Nature akin to our own that gives rise to our anthropomorphism. We recognize in the living world about us the use of specific means to specific ends and this we call intelligence. It differs from our own in that it is not selective and intensive in the same way. It does not take short cuts; it does not aim at human efficiency; it does not cut out waste and delay and pain. It is the method of trial and error. It hits its mark because it hits all marks. Species succeed because the tide that bears them on is a universal tide. It is not a river but an ocean current. Nature progresses, but not as man does by discarding one form and adapting a higher. She discards nothing; she keeps all her old forms and ways and out of them evolves the higher; she keeps the fish's fin, while she perfects the bird's wing; she preserves the invertebrate, while she fashions the vertebrate; she achieves man, while she preserves the monkey. She gropes her way like a blind man, but she arrives because all goals are hers. Perceptive intelligence she has given in varying degrees to all creatures, but reasoning intelligence she has given to man alone. I say "given," after our human manner of speaking, when I mean achieve. There is no giving in Nature—there is effort and development. There is interchange and interaction, but no free gifts. Things are bought with a price. The price of the mind of man—who can estimate what it has been through the biological and geological ages—a price which his long line of antecedent forms has paid in struggle and suffering and death. The little that has

been added to the size of his brain since the Piltdown man, and the Neanderthal man—what effort and pain has not that cost! We pay for what we get, or our forebears pay for it. They paid for the size of our brains, and we pay for our progress in knowledge.

The term religion is an equivocal and much abused word, but I am convinced that no man's life is complete without some sort of an emotional experience that may be called religious. Not necessarily so much a definite creed or belief as an attraction and aspiration toward the Infinite, or a feeling of awe and reverence inspired by the contemplation of this wonderful and mysterious universe, something to lift a man above purely selfish and material ends, and open his soul to influences from the highest heavens of thought.

Religion in some form is as natural to man as eating and sleeping. The mysteries of life and the wonder and terror of the world in which he finds himself, arouse emotions of awe and fear and worship in him as soon as his powers of reflection are born. In man's early history religion, philosophy, and literature are one. He worships before he investigates, he builds temples before he builds school houses or civic halls. He is, of course, superstitious long before he is scientific; he trembles before the supernatural long before he has mastered the natural. The mind of early man was synthetic as our emotions always are; it lumped things, it did not differentiate and classify. The material progress of the race has kept pace with man's power of analysis,—the power to separate one thing from another, to resolve things into their component parts and recombine them to serve his own purposes. He gets water power, steam power, electric power, by separating a part from the whole and placing his machinery when they tend to unite again.

Science tends more and more to reveal to us the unity that underlies the diversity of nature. We must have diversity in our practical lives, we must seize Nature by many handles. But our intellectual lives demand unity, demand simplicity amid all this complexity. Our religious lives demand the same. Amid all the diversity of creeds and sects we are coming more and more to see that religion is one, that verbal differences and ceremonies are unim-

portant, and that the fundamental agreements are alone significant. Religion as a key or passport to some other world has had its day, as a mere set of statements or dogmas about the Infinite mystery it has had its day. Science makes us more and more at home in this world and is coming more and more, to the intuitional mind, to have a religious value. Science kills credulity and superstition, but to the well-balanced mind it enhances the feeling of wonder, of veneration, and of kinship which we feel in the presence of the marvellous universe. It quiets our fears and apprehensions, it pours oil upon the troubled waters of our lives, and reconciles us to the world as it is. The old fickle and jealous gods begotten by our fears and morbid consciences fall away, and the new gods of law and order, who deal justly, if mercilessly, take their places.

"The mind of the universe which we share," is a phrase of Thoreau's—a large and sane idea which shines like a star amid his many fire-fly conceits and paradoxes. The physical life of each of us is a part or rill of the universal life about us, as surely as every ounce of our strength is a part of gravity. With equal certainty, and under the same law, our mental lives flow from the fountain of universal mind, the cosmic intelligence which guides the rootlets of the smallest plant as it searches the soil for the elements it needs, and the most minute insect in availing itself of the things it needs. It is this primal current of life, the two different phases of which we see in our bodies and in our minds that continues after our own special embodiments of it have ceased; in it is the real immortality. The universal mind does not die, the universal life does not go out. The jewel that trembles in the dewdrop, the rain that lends itself to the painting of the prismatic colors of the bow in the clouds, pass away, but their fountain-head in the sea does not pass away. The waters may make the wonderful circuit through the clouds, the air, the earth, and the cells and veins of living things, any number of times,—now a globule of vapor in the sky, now a star-like crystal in the snow, now the painted mist of a waterfall, then the limpid current of a mountain brook—and still the sea remains unchanged. And though the life and mentality of the globe pass daily and are daily renewed, the primal source of those things is as abounding as ever. It is not you and I that are immortal, it is Creative Energy of which we are a

part. Our personal immortality is swallowed up in this.

The poets, the prophets, the martyrs, the heroes, the saints,—where are they? Each was but a jewel in the dew, the rain, the snow-flake,—throbbing, burning, flashing with color for a brief time, and then vanishing; adorning the world for a moment and then caught away into the great abyss. “O, spend-thrift Nature!” our hearts cry out, but Nature’s spending is only the ceaseless merging of one form into another without diminution of her material or blurring of her types. Flowers bloom and flowers fade, the seasons come and the seasons go, men are born and men die, the world mourns for its saints and heroes, its poets and saviors, but Nature remains and is as young and spontaneous and inexhaustible as ever. “Where is the comfort in all this to you and to me?” There is none, save the comfort or satisfaction of knowing things as they are. We shall feel more at ease in Zion when we learn to distinguish substance from shadow, and to grasp the true significance of the world of which we form a part. In the end each of us will have had his day, and can say as Whitman does,

I have positively appeared. That is enough.

In us or through us the Primal Mind will have contemplated and enjoyed its own works and will continue to do so as long as human life endures on this planet. It will have achieved the miracle of the Incarnation, and have tasted the sweet and the bitter, the victories and the defeats of Evolution. The legend of the birth and life of Jesus is but this ever-present naturalism written large with parable and miracle on the pages of our religious history. In the lives of each of us the supreme reality comes down to earth and takes on the human form and suffers all the struggles and pains and humiliations of mortal, finite life. Even the Christian theory of the vicarious atonement is not without its basis of naturalism. Men through disease and ignorance and half-knowledge store up an experience that saves future generations from suffering and failure. We win victories for our descendants, and bring the kingdom nearer for them by the devils and evil spirits we overcome.

JOHN BURROUGHS.